

CLAIMS

1. A piezoelectric transducer drive circuit (55) driving a piezoelectric transducer (56) boosting an alternating voltage applied intermittently to a pair of
5 primary electrodes (56a, 56b) and outputting the boosted alternating voltage from a secondary electrode (56c), comprising:

a detection circuit (61) detecting a signal indicating a state of a load (57) connected to the secondary electrode (56c) and outputting one of a peak voltage and an average voltage thereof;
10 an error amplification circuit (1) comparing the output voltage of the detection circuit (61) with an error reference voltage and outputting a voltage according to a difference therebetween; and

a voltage-controlled oscillator (63) controlled by the output voltage of the error amplification circuit (1) and generating a clock determining a frequency of the
15 alternating voltage applied to said primary electrodes (56a, 56b),

wherein said error amplification circuit (1) controls the voltage-controlled oscillator (63) such that, when a voltage-applying operation is stopped in an intermittent operation and thereafter the voltage-applying operation is started, said frequency of the alternating voltage is always gradually reduced from a high point and
20 stabilized.

2. The piezoelectric transducer drive circuit according to claim 1,
wherein said error amplification circuit (1) includes:

a differential operational amplifier (11) comparing the output voltage of the
25 detection circuit (61) supplied to one input terminal (E1N) via a resistor (10) with said error reference voltage supplied to the other input terminal, amplifying a differential voltage, and outputting the amplified differential voltage;

a variable current source (12) controlled by the differential operational amplifier

(11);

a constant current source (15) and a switch means (13) connected in series with the variable current source (12) between a power supply voltage and a ground voltage; and

5 a capacitor (19) having opposite ends connected to an output of the variable current source (12) and to the one input terminal of the differential operational amplifier (11), and

wherein said switch means (13) becomes nonconductive when the voltage-applying operation is stopped in the intermittent operation, and becomes conductive
10 when the voltage-applying operation is performed; and said error reference voltage has a first value when the voltage-applying operation is stopped in the intermittent operation, and gradually transits to a second value when the voltage-applying operation is started.

15 3. A cold cathode tube lighting device comprising a piezoelectric transducer drive circuit (55) driving a piezoelectric transducer (56) boosting an alternating voltage applied intermittently to a pair of primary electrodes (56a, 56b) and outputting the boosted alternating voltage from a secondary electrode (56c), said piezoelectric transducer drive circuit (55) comprising:

20 a detection circuit (61) detecting a signal indicating a state of a load (57) connected to the secondary electrode (56c) and outputting one of a peak voltage and an average voltage thereof;

an error amplification circuit (1) comparing the output voltage of the detection circuit (61) with an error reference voltage and outputting a voltage according to a
25 difference therebetween; and

a voltage-controlled oscillator (63) controlled by the output voltage of the error amplification circuit (1) and generating a clock determining a frequency of the alternating voltage applied to said primary electrodes (56a, 56b),

said error amplification circuit (1) controlling the voltage-controlled oscillator (63) such that, when a voltage-applying operation is stopped in an intermittent operation and thereafter the voltage-applying operation is started, said frequency of the alternating voltage is always gradually reduced from a high point and stabilized,

5 wherein said cold cathode tube lighting device further comprises:

 the piezoelectric transducer (56) driven by the piezoelectric transducer drive circuit (55) to boost the alternating voltage applied intermittently to the pair of primary electrodes (56a, 56b) and outputting the boosted alternating voltage from the secondary electrode (56c);

10 a cold cathode tube (57) connected as a load to the secondary electrode (56c) of the piezoelectric transducer (56); and

 an impedance device (58) connected in series with the cold cathode tube (57) to allow the detection circuit (61) of the piezoelectric transducer drive circuit (55) to detect the signal indicating the state of the load (57) connected to the secondary electrode (56c).

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4. The cold cathode tube lighting device according to claim 3, wherein said error amplification circuit (1) includes:

20 a differential operational amplifier (11) comparing the output voltage of the detection circuit (61) supplied to one input terminal (EIN) via a resistor (10) with said error reference voltage supplied to the other input terminal, amplifying a differential voltage, and outputting the amplified differential voltage;

 a variable current source (12) controlled by the differential operational amplifier (11);

25 a constant current source (15) and a switch means (13) connected in series with the variable current source (12) between a power supply voltage and a ground voltage; and

 a capacitor (19) having opposite ends connected to an output of the variable

current source (12) and to the one input terminal of the differential operational amplifier (11), and

5 wherein said switch means (13) becomes nonconductive when the voltage-applying operation is stopped in the intermittent operation, and becomes conductive when the voltage-applying operation is performed; and said error reference voltage has a first value when the voltage-applying operation is stopped in the intermittent operation, and gradually transits to a second value when the voltage-applying operation is started.